ENGINEERING ANLAYSIS REPORT (EAR) DISCUSSIONS

For the past 10 years as a DMRE or an Assistant, I have one time or another encountered different issues when dealing with EARs. Some issues are more common than others, which I would like to request to be addressed while we are on this topic.

Current Challenges:

- The language used in the Specifications is ambiguous and lack of consistency across different disciplines and materials, especially when related to the requirements of the Engineer who is considered to be eligible to perform the EAR evaluation. *Independent consultant or engineer and specialty engineer* were used interchangeably, as an example.
- Producers, such as prestress, follow a process different from our normal EAR process, in which the engineers on producers' payroll can perform and have performed EAR evaluations.

Consequently, the Specifications failed to be implemented consistently across the State and Materials; the EAR evaluation has also been performed by engineers without the required independence or competency in the area of concern.

As a result, the defective materials may not be disposed properly, and the Department's (owner's) interest could have been compromised by following the current process.

Recommended Actions:

- Clearly define and consistently use the terms as involved in EAR process.
- Develop a list of prequalified engineers statewide in the areas of expertise, just like what is shown in the attachment.
- We must define Specialty Engineer clearly. The current definition of a specialty engineer in our specification reads as if it is referring to the design side of our business. (*see the definition attached)*. We should redefine Specialty Engineer to say he/she should be a registered professional engineer in Florida who is prequalified to perform specialized work in the area of concern.

Possible solutions:

Write one EAR specification regarding the EAR Engineer requirement in addressing all areas of concern. That specification will be referenced when we are dealing with EAR in all areas.

The language could be such as:

Engineering Analysis:

A Specialty Engineer, who is an independent consultant, or the Contractor's Engineer of Record in a design build project as stated within each individual Section shall perform any such analysis; who is prequalified in the area of the work being performed, and cannot be an employee of the contractor, producer, or the quality control firm serving the same project.

The following are conflicting specification references associated with this issue:

Engineering Analysis references:

6-4 Defective Materials.
As an exception to the above, within 30 calendar days of the termination of the LOT or rejection of the material, the Contractor may submit a proposed scope of work to the Engineer for an engineering or independent laboratory (as approved by the Engineer) analysis to determine the disposition of the material. A Specialty Engineer, who is an independent consultant, or the Contractor's Engineer of Record as stated within each individual Section shall perform any such analysis. Upon the Engineer's approval of the scope of work submitted by the Contractor, the engineering analysis must be completed and the report must be submitted to the Engineer within 45 calendar days, or other time frame as approved by the Engineer. The report must be signed and sealed by the Specialty Engineer. The Engineer will determine the final disposition of the material after review of the information submitted by the Contractor. No additional monetary compensation or time extension will be granted for the impact of any such analysis or review.

334-5.9.5 Defective Material: Assume responsibility for removing and replacing all defective material placed on the project, at no cost to the Department.
As an exception to the above and upon approval of the Engineer, obtain an engineering analysis by an independent laboratory (as approved by the Engineer) to determine the disposition of the material. The engineering analysis must be signed and sealed by a Professional Engineer licensed in the State of Florida.
The Engineer may determine that an engineering analysis is not necessary or may perform an engineering analysis to determine the disposition of the material. Any material that remains in place will be accepted with a CPF as determined by 334-8, or as determined by the Engineer.

338-5.2 Category 1 Pavement:
(2) Remedial Work for Rutting: The Contractor may propose removal and replacement of less than the full depth of all layers by preparation and submittal of a signed and sealed engineering analysis report, demonstrating the actual extent of the distressed area(s). Remedial work must be performed in accordance with Table 338-1 unless approved otherwise by the Engineer.

346-3.2 Drilled Shaft Concrete:
If the elapsed time during placement exceeds the slump loss test data, provide an engineering analysis preformed by a Professional Engineer, registered in the State of Florida, and knowledgeable in the area of foundations, to determine if the shaft is structurally sound and there

are no voids in the drilled shaft concrete. At the direction of the Engineer, excavate the drilled

shaft for inspection. Obtain approval from the Engineer before placing any additional shafts.

346-3.3 Mass Concrete:

Request approval of reduced monitoring of same least dimensioned mass concrete elements containing the same mix design, concrete placement temperatures (within plus 3°F), and insulation thermal resistance value. The Specialty Engineer may monitor and record the temperature for the first element only. Each subsequent element must be started within one hour of the first placement and be completed within one hour of the completion of the first element.

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Each mass concrete element must be instrumented with monitoring devices in case of failure in meeting the one hour time limit.

Changes or adjustments made to the monitored element must be made to all elements. Failure to follow this will require an Engineering Analysis Report (EAR) for the elements not monitored even if the element that was monitored had a temperature differential well below the maximum allowed. The reduced monitoring option will not be allowed by the Engineer if the Contractor fails to comply with these requirements.

346-4.2.2 Control Level for Corrective Action: If chloride test results exceed the limits of Table 4, suspend concrete placement immediately for every mix design represented by the failing test results, until corrective measures are made. Perform an engineering analysis to demonstrate that the material meets the intended service life of the structure on all concrete produced from the mix design failing chloride test results to the previous passing test results. Supply this information within 30 business days of the failing test results from a Professional Engineer registered in the State of Florida, and knowledgeable in the areas of corrosion and corrosion control.

455-17.6.1.4 Evaluation of CSL Test Results: The Engineer will evaluate the observations during drilled shaft construction and CSL test results to determine whether or not the drilled shaft construction is acceptable. Drilled shafts with velocity reduction exceeding 30% are not acceptable without an engineering analysis.

455-21 Drilled Shaft Excavations Constructed out of Tolerance.

Do not construct drilled shaft excavations in such a manner that the concrete shaft cannot be completed within the required tolerances. The Contractor may make corrections to an unacceptable drilled shaft excavation by any combination of the following methods:

Backfill any out of tolerance shafts in an approved manner when directed by the Engineer until the redesign is complete and approved. Furnish additional materials and work necessary, including engineering analysis and redesign, to effect corrections of out of tolerance drilled shaft excavations at no expense to the Department.

Specialty Engineer references: (not all references are included)

Contractor's Engineer of Record.

A Professional Engineer registered in the State of Florida, other than the Engineer of Record or his subcontracted consultant, who undertakes the design and drawing of components of the permanent structure as part of a redesign or Cost Savings Initiative Proposal, or for repair designs and details of the permanent work. The Contractor's Engineer of Record may also serve as the Specialty Engineer.

The Contractor's Engineer of Record must be an employee of a pre-qualified firm. The firm shall be pre-qualified in accordance with the Rules of the Department of Transportation,

Chapter 14-75. Any Corporation or Partnership offering engineering services must hold a Certificate of Authorization from the Florida Department of Business and Professional Regulation.

As an alternate to being an employee of a pre-qualified firm, the Contractor's Engineer of Record may be a pre-qualified Specialty Engineer. For items of the permanent work declared by the State Construction Office to be "major" or "structural", the work performed by a prequalified Specialty Engineer must be checked by another pre-qualified Specialty Engineer. An individual Engineer may become pre-qualified in the work groups listed in the Rules of the Department of Transportation, Chapter 14-75, if the requirements for the Professional Engineer are met for the individual work groups. Pre-qualified Specialty Engineers are listed on the State Construction Website. Pre-qualified Specialty Engineers will not be authorized to perform redesigns or Cost Savings Initiative Proposal designs of items fully detailed in the plans.

Engineer of Record.

The Professional Engineer or Engineering Firm registered in the State of Florida that develops the criteria and concept for the project, performs the analysis, and is responsible for the preparation of the Plans and Specifications. The Engineer of Record may be Departmental inhouse staff or a consultant retained by the Department.

The Contractor shall not employ the Engineer of Record as the Contractor's Engineer of Record or as a Specialty Engineer.

6-4 Defective Materials.

As an exception to the above, within 30 calendar days of the termination of the LOT or rejection of the material, the Contractor may submit a proposed scope of work to the Engineer for an engineering or independent laboratory (as approved by the Engineer) analysis to determine the disposition of the material. A Specialty Engineer, who is an independent consultant, or the Contractor's Engineer of Record as stated within each individual Section shall perform any such analysis. Upon the Engineer's approval of the scope of work submitted by the Contractor, the engineering analysis must be completed and the report must be submitted to the Engineer within 45 calendar days, or other time frame as approved by the Engineer. The report must be signed and sealed by the Specialty Engineer. The Engineer will determine the final disposition of the material after review of the information submitted by the Contractor. No additional monetary compensation or time extension will be granted for the impact of any such analysis or review.

Specialty Engineer.

A Professional Engineer registered in the State of Florida, other than the Engineer of Record or his subcontracted consultant, who undertakes the design and drawing preparation of components, systems, or installation methods and equipment for specific temporary portions of the project work or for special items of the permanent works not fully detailed in the plans and required to be furnished by the Contractor such as but not limited to pot bearing designs, nonstandard expansion joints, MSE wall designs and other specialty items. The Specialty Engineer may also provide designs and details for items of the permanent work declared by the State Construction Office to be "minor" or "non-structural". The Specialty Engineer may be an employee or officer of the Contractor or a fabricator, an employee or officer of an entity providing components to a fabricator, or an independent consultant.

For items of work not specifically covered by the Rules of the Department of Transportation, a Specialty Engineer is qualified if he has the following qualifications:

(1) Registration as a Professional Engineer in the State of Florida.
(2) The education and experience necessary to perform the submitted design as required by the Florida Department of Business and Professional Regulation.

Independent Engineer references:

4-3.9.6 Conditions of Acceptance for Major Design Modifications of Category 2 Bridges: A Proposal that proposes major design modifications of a category 2 bridge, as determined by the Engineer, shall have the following conditions of acceptance: All bridge plans relating to the Proposal shall undergo an independent peer review conducted by a single independent engineering firm referred to for the purposes of this article as the Independent Review Engineer who is not the originator of the Proposal design, and is pre-qualified by the Department in accordance with Rule 14-75, Florida Administrative Code.

Construction

Office of Construction / Engineering Area / Specialty Engineer

Pre-Qualified Specialty Engineer

This table provides brief clarifications to the works that are allowed to be performed by Contractor's Engineer of Record, Pre-qualified Specialty Engineer and Specialty Engineer as defined in Specification Section 1. For definitions, additional information and further clarifications refer to Specification Section 1.

Work Type	Contractor's Engineer of Record	Pre-qualified Specialty Engineer	Specialty Engineer
Re-design	Yes	No	No
VECP	Yes	No	No
Details of the permanent work not fully detailed in the plans (Example: Pot Bearing Design, non-standard expansion joints, MSE walls, other specialty items)	Yes	Yes	Yes
Design and details of the permanent work declared to be minor or non-structural including minor repairs	Yes	Yes	Yes
Design and details of the permanent work declared to be major or structural including major repairs	Yes	Yes*	No
Design and drawings of temporary works, such as falsework, formwork, etc.	Yes	Yes	Yes

*The work must also be checked by another pre-qualified Specialty Engineer

Here is the link to Rule 14-75 which has been referenced in our specifications. There is no specialty engineer being defined in this rule.

http://www.dot.state.fl.us/procurement/pubs/Rule%2014-75new.pdf

Here is the current list for the prequalified specialty engineers.

http://www.dot.state.fl.us/construction/Engineers/Specialty/SpecialtyMain.shtm